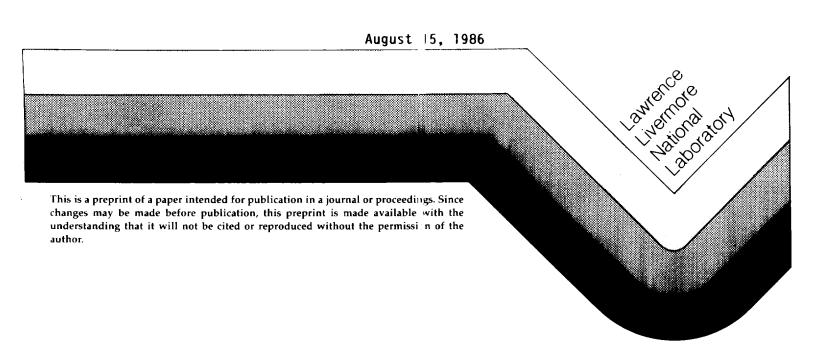
THE Be-Np (BERYLLIUM-NEPTUNIUM) SYSTEM

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IN TWO WEEKS

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The Be-Np (Beryllium-Neptunium) System

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Equilibrium Diagram

The melting point of β Be and the β Be —> α Be allotropic transformation temperature are 1289 \pm 4 and 1270 \pm 6 °C, respectively [86BAP]. The melting point of γ Mp and the γ Mp —> β Mp —> α Mp allotropic transformation temperatures are 639, 576, and 280 °C, respectively [85War].

An X-ray diffraction study of [54Run] showed that only one intermediate phase, Be₁₃Mp, exists in the Be-Np system. Be₁₃Mp did not melt on heating to 1400 °C [54Run]. This phase was considered to have some homogeneity range because the lattice parameter varied in samples of different composition [54Run].

Crystal Structures

The crystal structure and lattice parameter data are given in Table 1. The structure of Be₁₃Np is isomorphous to NaZn₁₃ [54Run]. The observed contraction of Be₁₃Np on the Np-rich side may be due to formation of a Be defect structure [54Run].

Cited References

- *54Run: O.J.C. Runnalls, "The Intermetallic Phase NpBe₁₃", <u>Acta Crystallogr.</u>, <u>7</u>, 222-223 (1954). (Equi Diagram, Crys Structure; Experimental)
- 84Ste: G.R. Stewart, Z. Fisk, J.L Smith, J.O. Willis, and M.S. Wire, "New Heavy-Fermion System, NpBe₁₃, with a Comparison to UBe₁₃ and PuBe₁₃", Phys. Rev. B, 30(3), 1249-1252 (1984). (Crys Structure; Experimental)
- 85War: J.W. Ward, P.D. Kleinschmidt, and D.E. Peterson, "Thermochemical Properties of the Actinide Elements and Selected Actinide-Noble Metal Intermetallics," <u>Handbook of the Physics and Chemistry of the Actinides</u>, (ed.) C. Keller and A. Freeman, North-Holland, Amsterdam (1985). (Equi Diagram; Review)
- 86BAP: to be published in <u>Bull. Alloy Phase Diagrams</u>, (1986). (Equi Diagram; Compilation)
- * Indicates key paper.

General References

[King1]: H.W. King, "Crystal Structures of the Elements at 25 °C", <u>Bull.</u>
<u>Alloy Phase Diagrams</u>, 2(3), 401-402 (1981)

[King2]: H.W. King, "Temperature-Dependent Allotropic Structures of the Elements", Bull. Alloy Phase Diagrams, 3(2), 275-276 (1982)

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Table 1 Be-Np Crystal Structure and Lattice Parameter Data

Composition, Phase at.% Np		Struktur- n bericht designation	'		Lattic a			nm eference
(ßBe) O	c12	A2	I m@m	W	0.25515	a = =	n n 2	[King2]
(xBe) O	hP2	A3	P6≊/mmc	Mg	0.22857	(0.35839	EKingil
Be ₁₃ Np~7.14(a) (b) 7.14	cF112	D2 ₃	Fm3c	NaZn ₁₃	1.0266 1.0256 1.0267			[54Run] [84Ste]
(TNp) 100	c I 2	A2 .	Im3m	W	0.352			[King2]
(βNp) 100	tP4	Aa	P42 ₁ 2	βNp	0.4896	n • •	0.3387	[King2]
(xNp) 100	oP8	Ac	Pnma	αNp	0.6663	0.4723	0.4887	[King1]

⁽a) Be-rich. (b) Np-rich.